

## CLAIMS

1. Method of treating chemical pulp comprising at least cooking cellulose fibrous material, washing the cooked pulp in several stages and delignificating/washing the pulp in an oxygen stage following the wash of the pulp, characterized in that at least part of the filtrate of some washing stage preceding the washing of the pulp is treated with an oxidizing chemical before said filtrate or part of it is used as washing liquid in a wash preceding the wash prior to said oxygen stage in order to decrease or prevent the reactions between the oxygen and some cook-originating organic material in the presence of the pulp.
2. Method according to claim 1, characterized in that at least part of the washing liquid used in the wash preceding the oxygen stage is filtrate obtained from the washer following the oxygen stage.
3. Method according to claim 1, characterized in that the wash preceding the oxygen stage is performed by means of a suction drum filter, a diffuser, a belt washer, a multi-stage drum filter or a press.
4. Method according to claim 1 or 2, characterized in that only the part of the filtrate that is being used as washing liquid is treated with an oxidizing chemical.
5. Method according to claim 1, characterized in that the oxidizing chemical is oxygen or hydrogen peroxide or a derivative thereof.
6. Method according to claim 1, characterized in that the washing apparatus is a multi-stage drum filter or several drum filters connected in series.
7. Method according to claim 1 and 6, characterized in that said filtrate is obtained from a washing stage of said multi-stage drum filter and treated with an oxidizing chemical before it is returned back to another washing stage of said multi-stage drum filter to be used as washing liquid.

- 2623 8. Method according to claim 3, characterized in that the washing apparatus is a combination of said devices or a series connection of a said device.
- 5 9. Method according to claim 8, characterized in that said filtrate is obtained from a filtrate tank of said series connection and returned as washing liquid to a said washing device.
- 10 10. Method according to claim 1, characterized in that said at least part of the filtrate of the washing device preceding the oxygen stage is led after the washer into chemical mixing, after which the filtrate-chemical mixture is allowed a sufficient retention time after which the oxidized filtrate is led to a preceding washer as washing liquid.
- 15 11. Method according to claim 10, characterized in that the chemical to be mixed is gaseous, whereby after a certain retention time said filtrate-chemical mixture is led to gas-separation prior to leading the filtrate to a preceding washer as washing liquid.
- 20 12. Method according to claim 11, characterized in that said gas-separation is effected in an open container, wherefrom the filtrate is pumped to a preceding washing device.
- 25 13. Method according to claim 11, characterized in that said gas-separation is effected by means of a discharging device, wherefrom the filtrate is led directly to a washing device as washing liquid.
- 30 14. Method according to claim 1, characterized in that after the washing effected with oxidized filtrate, the pulp is led to an oxygen stage having a pH more than 7.5, a pressure of 1 – 17 bar (abs.), a temperature between 75 – 120 °C and treatment time between 0.5 – 120 minutes.

15. Method according to claim 14, characterized in that oxygen in the amount of 1 – 50 kg/ADT pulp and alkali in the amount of 1 – 60 kg/ADT pulp is fed into said oxygen stage.
16. Method according to claim 14 or 15, characterized in that said oxygen stage comprises one or several steps, whereby the steps are counted according to the mixing and chemical dosing.
17. Method of treating chemical pulp comprising at least cooking cellulose fibrous material, washing the cooked pulp in several stages and delignifating/bleaching the pulp in an oxygen stage following the washing of the pulp, characterized in that in order to decrease or prevent disadvantageous reactions between the oxygen and cook-originating organic material in the presence of pulp, the retention time of the pulp between the digester blow and the oxygen stage feed is minimized so that it is less than 60 minutes and that during this retention the pulp is washed so that the washing efficiency expressed as  $E_{10}$ -value is more than 3 and that the dilution factor is positive.
18. Method according to claim 17, characterized in that when said retention time is in the range of 50 minutes, the washing efficiency as  $E_{10}$ -value is preferably at least 7, more preferably about 10.
19. Method according to claim 17, characterized in that when said retention time is 15 – 50 minutes, the washing efficiency as  $E_{10}$ -value is at least 5, preferably more than 7, more preferably more than 10.
20. Method according to claim 17, characterized in that when said retention time is 1 – 15 minutes, the washing efficiency as  $E_{10}$ -value is at least 3, preferably 5, more preferably more than 7, most preferably about 10.
21. Method according to claim 17, characterized in that the method utilizes at least one pressurized reaction vessel or a reaction tube for the filtrate between the cook and the oxygen stage.

22. Method according to claim 17, characterized in that the wash is effected by means of a washer comprising more than one stage.

5 23. Method according to claim 22, characterized in that the retention of the pulp in the washer is less than 3 minutes.

24. Method according to claim 22, characterized in that the time between the digester blow and the wash is not more than 10 minutes.

10

25. Method according to claim 17, characterized in that the pulp is led by means of the pressure of the digester to the wash and therefrom to the oxygen stage feed pump.

15 26. Method according to claim 17, characterized in that the pulp is pumped by means of no more than one pump prior to the oxygen stage.

Sub-H4  
20 27. Apparatus for treating chemical pulp, which apparatus comprises at least a digester (100) for cellulose fibrous material, so-called brown stock washing devices (102), devices (110) following the wash (102) of the pulp for delignifying/bleaching the pulp in the oxygen stage and devices (122) for washing the pulp after the oxygen stage (110) and further filtrate lines (FL) for leading washing filtrates countercurrently to preceding washers to be used as washing liquid, characterized in that the filtrate line (FL) preceding the oxygen stage is provided with devices (124, 126, 128, 130) for treating the filtrate flowing in that part of the line with oxidizing chemical.

25

28. Apparatus according to claim 27, characterized in that said oxidizing devices (124, 126, 128, 130) are arranged in a washing water line (FL) located between the washer (108) just prior to the oxygen stage (110) and the washer (1022) preceding said washer (108).

30

29. Apparatus according to claim 27, characterized in that said oxidizing devices comprise at least a mixer (126).

30. Apparatus according to claim 29, characterized in that the mixer used is a filtrate pump (122) or a mixer (126) arranged in the filtrate line (FL) for that special purpose.

5

31. Apparatus according to claim 27, characterized in that the apparatus further comprises after the mixer (126) a reaction vessel (128) or flow pipe, by means of which a sufficient reaction time is effected for the filtrate and the chemical.

10 32. Apparatus according to claim 27 and 29, characterized in that when using a gaseous chemical, in the filtrate line after the mixer (126) there is arranged a separator (130) for excess non-reacted gas.

15 33. Apparatus according to claim 32, characterized in that said gas-separator (130) is connected to the filtrate tank wherein the separated gas and foam possibly separated with it are led.

34. Apparatus according to claim 27, characterized in that the filtrate system preceding the oxygen stage (110) comprises at least one pressurized reaction vessel.

20

35. Apparatus for washing pulp between the digester blow and the oxygen stage, characterized in that the washing efficiency of the washing devices as  $E_{10}$  value is more than 5, preferably more than 7 and the retention time of the pulp between the blow of the digester and the oxygen stage feed is less than 30 minutes, preferably less than 15 minutes, most preferably less than 5 minutes.

25

36. Apparatus according to claim 35, characterized in that between the cook and the oxygen stage there is arranged at least one pressurized filtrate tank.

30 37. Apparatus according to claim 36, characterized in that the washing device used is a washer comprising more than one stage, wherein the time for the wash as a whole is not more than 3 minutes.

38. Apparatus according to claim 36, characterized in that the duration of one washing stage is not more than 1.5 minutes.
- 5 39. Apparatus according to claim 37, characterized in that the washing device is a 1,x -staged drum washer, wherein x is between 1 - 9 both said numbers included and that the thickness of the pulp cake to be washed is less than 100 mm.
- 10 40. Apparatus according to claim 39, characterized in that the 1,x -staged arrangement has been effected, in addition to the fed washing liquid, by means of internal liquid circulations of the washer.